

## 20mN, Variable Specific Impulse Colloid Thruster, Phase II

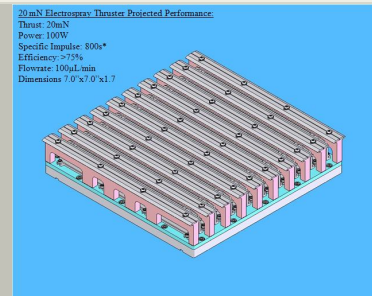
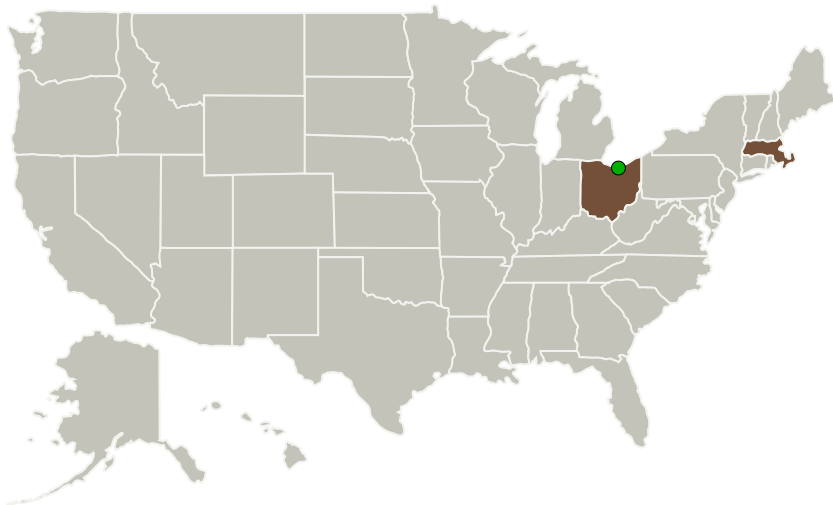
Completed Technology Project (2012 - 2015)



## Project Introduction

During Phase I, Busek designed and manufactured an electrospray emitter capable of generating 20 mN in a 7" x 7" x 1.7" package. The thruster consists of nine porous-surface emitters operating in parallel from a common propellant supply. Each emitter is capable of supporting over 70,000 electrospray emission sites, with the plume from each emitter being accelerated through a single aperture, eliminating the need for individual emission site alignment to an extraction grid. The total number of emission sites during operation is expected to approach 700,000. Phase II results will focus on optimization and characterization of the thruster fabricated during the Phase I effort, as well as fabrication of additional porous emitters for full-scale testing. Propellant will be supplied to the thruster via existing feedsystem and micro-valve technology previously developed by Busek, under the NASA ST7-DRS mission, and follow-on electric propulsion programs. Methods for extending thruster life beyond the previously demonstrated 450 hours, will be investigated and include potential alternate emitter materials selection, and bi-polar thruster operation. The life extending capabilities will be demonstrated on a sub-scale version of the thruster developed.

## Primary U.S. Work Locations and Key Partners



20mN, Variable Specific Impulse Colloid Thruster Project Image

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Organizations Performing Work	Role	Type	Location
Busek Company, Inc.	Lead Organization	Industry Women-Owned Small Business (WOSB)	Natick, Massachusetts
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

## Primary U.S. Work Locations

Massachusetts	Ohio
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## Project Transitions

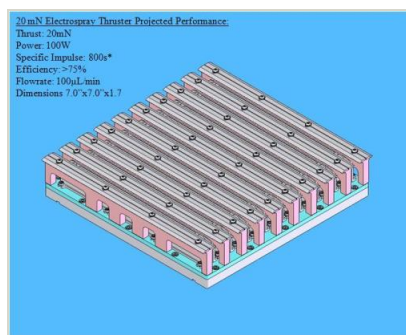
▶ **April 2012:** Project Start

✓ **April 2015:** Closed out

## Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/137369>)

## Images



## Project Image

20mN, Variable Specific Impulse Colloid Thruster Project Image  
(<https://techport.nasa.gov/image/127614>)

## Organizational Responsibility

## Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

## Lead Organization:

Busek Company, Inc.

## Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

## Program Director:

Jason L Kessler

## Program Manager:

Carlos Torrez

## Principal Investigator:

Nathaniel Demmons

## Co-Investigator:

Nathaniel Demmons

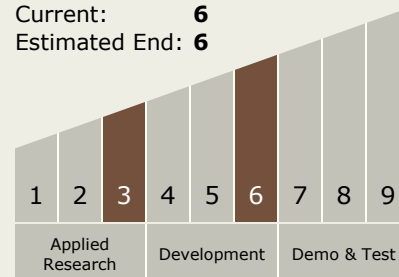
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### Technology Maturity (TRL)

Start: **3**  
Current: **6**  
Estimated End: **6**



### Technology Areas

#### Primary:

- TX01 Propulsion Systems
  - └ TX01.2 Electric Space Propulsion
    - └ TX01.2.2 Electrostatic

### Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System